

Appl. No.: 09/483,737
Amdt. Dated April 18, 2007
Reply to Office action of January 18, 2007

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REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1, 9-10, and 15 remain in the application. Claims 2-8, 11-14, and 16-17 have been previously cancelled. Claims 1 and 9-10 have been previously withdrawn and rejoinder thereof is requested upon allowance of claim 15.

In item 3 on pages 2-3 of the above-mentioned Office action, claim 15 has been rejected as being unpatentable over Spaeth et al. (US 5,943,553) in view of Komata et al. (JP 2-15897) under 35 U.S.C. § 103(a).

In item 4 on pages 3-5 of the above-mentioned Office action, claim 15 has been rejected as being unpatentable over Kurokawa et al. (JP 63-136533) in view of Komata et al. and Bacon et al. (US 5,234,153) under 35 U.S.C. § 103(a).

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

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Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 15 calls for, inter alia:

a solder containing at least two components with at least two metal-containing constituents including a first constituent X being formed of a precious metal and a second constituent Y being consumed during a soldering operation by one of reacting and being dissolved in materials which are to be joined, and said solder having a hypereutectic concentration of said second constituent Y;

a substrate; and

a semiconductor chip having a rear side and an adhesive or diffusion barrier provided on said rear side, said adhesive or diffusion barrier being provided directly on said solder;

said semiconductor chip being secured at said rear side to said substrate by one of alloying and brazing using said solder to form a chip-substrate connection by said solder;

said solder containing a gold-tin compound (AuSn) having a composition by weight of Au to Sn of 70 to 30 and forming a layer having a thickness of from about 1 μm to about 2 μm ;

Sn contained in said solder diffusing away from said solder into adjoining layers, loss of Sn providing a continuous reduction in a melting temperature during a soldering procedure.

Spaeth et al. disclose a method for manufacturing a semiconductor laser component which has a single conductor body with surfaces, a covering layer disposed on a partial area of the surfaces and a support plate secured to one of the

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surfaces. The support plate can be used as an electrical or thermal terminal.

Spaeth et al. describe the problem of connecting a semiconductor body with a support plate, for example a hard solder. This method tries to avoid contamination of the contact surfaces of semiconductor bodies of laser diode chips with purely wetable material. The method may be incorporated in a method for manufacturing a semiconductor laser.

Komata et al. teach an Au-Sn alloy solder. It is noted that in the present invention, Sn contained in the solder diffuses into adjoining layers of metal such as the substrate.

Although the Au-Sn alloy solder of Komata et al. may be formed as a brazing filler material wire and be used for bonding IC package as stated in the abstract of Komata et al., this does not mean that there are adjoining metal layers the Sn can diffuse into. If there is no way for a loss of Sn, a continuous reduction in the melting temperature during the soldering procedure is impossible. Therefore, the advantages of the present invention cannot be reached by a wire that is per coincidence composed of the same alloy.

Kurokawa et al. and Bacon et al. have already been discussed in detail in the previous responses. They do not make up for

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the deficiencies of Spaeth et al. and Komata et al. as discussed above.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 15. Claim 15 is, therefore, believed to be patentable over the art.

In view of the foregoing, reconsideration and allowance of claim 15 are solicited. Rejoinder of method claims 1 and 9-10 is requested upon allowance of product claim 15 under MPEP 821.04 ("if applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim will be rejoined").

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out.

If an extension of time for this paper is required, petition for extension is herewith made. Please charge any fees which might be due with respect to 37 CFR Sections 1.16 and 1.17 to

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the Deposit Account of Lerner Greenberg Stemer LLP, No. 12-1099.

Respectfully submitted,

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